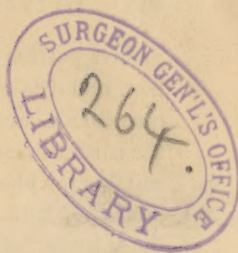


Oliver (H. K.)



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ART. I.—*Cases of Aphonia from Paralysis of Intrinsic Muscles of the Larynx. Treatment by External Manipulation of the Organ and Restoration of the Voice in a Single Sitting.* By HENRY K. OLIVER, M.D., Physician to the Massachusetts General Hospital, Boston. (With seven wood-cuts.)

OF the various affections of the larynx, the neuroses have always been among the most interesting, and, since the means of inspecting the interior of the organ in the living subject have been at our command, the paralysis of its intrinsic muscles have excited marked attention. It is now possible to say, with a great degree of precision, what particular muscles are deprived of their power in any case, and thus to classify pathological conditions which were formerly comprehended under the general term, Paralysis of the Glottis.

I purpose suggesting a novel mode of treatment in the form of laryngeal paralysis called, by Mackenzie, "Paralysis of the Adductors of the Vocal Chords;" and by Tobold, "Phonic Paralysis," a form bilateral in character, and dependent, in the majority of cases, upon general debility and hysteria, or other impairment of the nervous system, but sometimes upon emotional influences and a weakened condition of the muscles following laryngitis or the straining of the voice, and more rarely upon rheumatism and other blood diseases.

On laryngoscopic examination, either complete or incomplete paralysis of the cords will be found. In the former case, these ligaments, on attempted phonation, remain widely separated. In the latter case they approach the median line of the glottic aperture to a greater or less extent; they may even come nearly into apposition with each other for the

greater portion of their length, but the vocal processes will not be in contact, and the cartilaginous glottis will not be wholly closed. In some cases the vocal processes will come into apposition with each other, and the cartilaginous glottis will be closed; the parts are then in a position suitable for phonation, but when the air is forced against the cords they are not able to retain their position, but separate without vibrating. At other times the cartilaginous glottis will be partially closed by an incomplete approximation of the arytenoid cartilages, whilst the vocal processes and, of course, the vocal cords, remain separated.

The methods of treatment commonly employed in the affection which has been spoken of, are as follows:—

1st. Galvanism.

2d. The application of stimulating liquids to the interior of the larynx, or the inhalation of stimulating gases.

3d. The “Gymnastic of the Larynx,” suggested by Von Bruns, of Tübingen.¹

4th. The employment of an anæsthetic.

5th. A general course of treatment only, such as change of air, tonics, &c.

It is well known, moreover, that, in this affection, the voice has been suddenly restored under some general excitement or mental impression.

In addition to the methods of treatment above enumerated, I propose that by the external manipulation of the larynx. This method consists chiefly in the compression of the wings of the thyroid cartilage in their posterior and upper part by the thumb and forefinger. Such compression, if practised on the dead larynx, will be found to approximate, to a certain degree, the arytenoid cartilages, and, as a consequence, the vocal cords. These ligaments will also become somewhat tenser. If the compression be made in the living subject, the same approximation and stretching of the cords may be observed by the laryngoscope.

In employing this method in paralysis of the adductors, the patient is instructed to make an effort to produce a sound, like that of *a* or *ah*, or any sound of the voice whatever, while compression of the larynx is being made. The result generally is that, after a little time, a feeble voice-sound is produced, and this is followed shortly after by the full restoration of the voice.

Many of these cases seem to be dependent upon a lack of power to *start the machinery* of the vocal apparatus completely, if the expression

¹ In this method of treatment the patient is asked to produce simple sounds, as of the vowels or diphthongs, while the laryngeal mirror is in position in the pharynx. It has been practised by Von Bruns with some success. Occasionally the voice has been restored in a single sitting, but generally the treatment has extended over a considerable period.

may be allowed. When once started, by any means, the power of keeping up the action is pretty easily afforded. The paralysis seems, therefore, to be of an unusual character; indeed, the many well-known instances of sudden restoration of the voice, either unaided by any local treatment, or induced by direct stimulus¹ to the interior of the larynx, show a condition quite peculiar to the laryngeal muscles.

It has come to the knowledge of every physician, probably, that quacks have succeeded in restoring the voice, immediately, by grasping the throat and producing violent compression. The recovery, under such circumstances, may have been owing, in a measure, to the mental impression upon the patient, but it may have been aided by such an adaptation of the parts of the larynx as I have described, a condition of things unappreciated by the operator, but leading none the less to a successful result.

As an aid to this manipulation of the larynx, I have taken advantage of the valvular nature of the vocal cords, an anatomical fact first, so far as I am aware, demonstrated by John Wyllie, M. D., M.R.C.S., in a prize dissertation entitled "Observations on the Physiology of the Larynx," published in the *Edinburgh Medical Journal*, vol. xii. (September, 1866). Reference to this subject will make a digression necessary.

Dr. Wyllie shows that the vocal cords, when approximated, constitute a valve opening outwards, while the false cords form a valve opening inwards. In the complete glottic closure, when inspiration and expiration are impossible, the former act is prevented by the vocal cords, and the latter by the false cords. He observes, after describing his experiments upon the larynx:—

"The conclusion to be derived from these experiments is obvious. There is within the larynx a double valve which is capable of controlling both the exit and entrance of air. The plan found so commonly throughout the body in such structures, in the aortic and ileo-cæcal orifices, and in the course of the veins, holds good here likewise. In the upper half the resemblance is most obvious. Comparing it with the aortic valve, we find the representatives of the sinuses of Valsalva in the well-marked ventricles of Morgagni, whilst the cusps are reproduced in the two folds of mucous membrane, whose free edges are known as the false vocal cords.

"The same design may be traced in the lower half of the valve. When the true vocal ligaments are brought into apposition, no deep sinus is found on either side, but their upper surfaces form together a broad flattened plane, slightly hollowed out exterior to the margins of the rima glottidis, and this arrangement, owing to the greater density and mobility of the parts, is found to act as efficiently as the well-marked ventricles and cusps of the upper valve."

A longitudinal section of the larynx, through the middle of the vocal cords, shows this valvular arrangement clearly. The annexed Fig. 1 is an outline of the representation given by Dr. Wyllie. A is the vocal cord; B the false cord; c the wedge-shaped space below the vocal cord; p the wedge-shaped space above the false cords; E the ventricle of Morgagni.

¹ Either of a single shock of the galvanic current, or the local contact of the uncharged sponge.

Annexed, also, are outlines of the interior of the larynx, taken from sections of gypsum casts.¹ In the larynx from which the outline Fig. 2

Fig. 1.

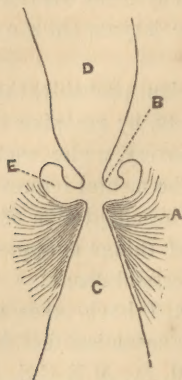


Fig. 2.



was taken, the vocal cords and the false cords were brought slightly out from the side of the organ. In that from which Fig. 3 was taken the ligaments were brought into apposition, while in Fig. 4 the vocal cords, only, were approximated.

Fig. 3.

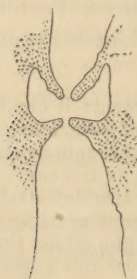


Fig. 4.



It will readily be seen that, on account of the wedge-shaped space below the vocal cords, the expired current of air can easily force the vocal cords apart, even when they are tightly closed, but that it will find effectual resistance at the false cords, where the ventricles will be inflated and these

¹ The following method of preparing outlines of the interior of the larynx occurred to me, and the results have been quite satisfactory:—

A cast in gypsum of the interior is first made; this is then painted black, and, when dry, is set upright in a box an inch or two square, and of a height corresponding to the length of the cast, and into the box is poured liquid gypsum. After hardening, a section of the mass is made with a watch-spring saw. The outline of the interior is thus clearly represented by the line of black; this line is, in fact, an exact counterpart of the mucous membrane in section.

folds be brought firmly into apposition. In the inverse action, namely, in inspiration, the air can easily wedge apart the false cords, while the vocal cords become the resisting bodies.

In cases of bilateral paralysis of the abductors of the vocal cords, viz., the posterior crico-arytenoid muscles, the approximation of the cords in inspiration, and their separation in expiration, have been frequently noticed by the laryngoscope, and, so well do these ligaments act the part of valves, under such circumstances, that suffocation is often only averted by the performance of tracheotomy. The noisy character of inspiration and the noiseless character of expiration are also remarked in these cases.¹

It is this action of the *vocal cords* only which concerns us now.

In regard to the vibratory function of the vocal cords by the inspired current of air, the following remarks are submitted: While it is true that the pressure of this current tends to bring the cords more firmly together when once they are in contact and the current is suddenly interrupted, yet the inflowing column occasions the vibration of the ligaments when they are more or less approximated, but not in intimate contact. Again, when the vocal cords are not sufficiently approximated to oppose a resistance to the air capable of exciting vibration, such an approximation may, by virtue of their valvular character already alluded to, be obtained by making strong and sudden inspirations: provided, however, that they are previously brought together somewhat, so as to become a material obstacle to the passage of air. In other words, there is a degree of approximation of the cords insufficient for their vibration, but sufficient for the offering of resistance to the air; and the form of the obstructing bodies is such that the air tends to approximate them still more rather than to separate them, and that to a degree sufficient for vibratory action. In this movement of approximation the air acts the same part in relation to the cords that the blood does in relation to the aortic valves, except as regards the degree of closure. This action of the vocal cords with forced inspiration during compression of the thyroid cartilage, as described, I have verified by auto-laryngoscopic observations. The degree of approximation necessary for inducing vibration with inspiration seems to be considerably less than that required with expiration—a fact which goes to confirm the assertion that the form of the cords is such as to offer a greater resistance to the inflowing than to the outflowing column of air.²

¹ In the pathological conditions which are accompanied by œdema of the larynx, in which the ary-epiglottidean fold, which forms the superior aperture of the larynx, is often the most affected, the swollen parts form a third valve opening outwards. A characteristic symptom of this affection, when the false cords are but little implicated, is difficulty of inspiration, expiration being comparatively easy.

² In hurried breathing the vocal cords may often be observed to move slightly outwards in inspiration, thus enlarging the glottic aperture, while they return to their former position in expiration. A reasonable explanation of this

Now, in the method of treatment I have suggested, a degree of approximation in the cords sufficient for decided resistance to the air is to be obtained by the compression of the wings of the thyroid cartilage, and a still further approximation, sufficient for vibration of these ligaments, by making strong and sudden inspirations. In the two most obstinate cases recorded below, therefore, the patients were instructed to attempt to make a sound by strong and sudden inspirations during compression of the larynx. The efforts were successful, and in both instances a voice-sound could be produced by inspiration before any could be made by expiration in the natural way. When, however, the vibration of the cords was once excited, their action in the normal way followed in a short time.

The cases to be presented are six in number, comprising all in which I have employed this method. None are instances of complete paralysis, and I have not had an opportunity of testing the treatment upon this extreme form. I do not, however, doubt its efficacy, inasmuch as these cases often yield to a single application of galvanism.

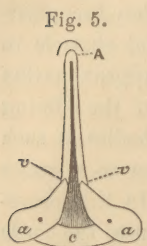
CASE I.—Mrs. C., widow, aged 73 years, came to me in November, 1867. Her general health had always been good. In 1857 she lost her voice suddenly, no cause therefor being apparent. The voice returned of itself three months afterwards, its reappearance being also abrupt.

In November, 1866, while absent from home, she had typhoid fever. Some weeks afterwards she lost her voice suddenly again. At this time she had not fully recovered her strength, but was sufficiently strong to return to her place of residence. A second time the voice returned of itself, and in about four weeks.

Six months before visiting me aphonia occurred again, and she had not spoken a word since.

For her age, Mrs. C. seemed in excellent general health and condition, although she thought she had not been quite as strong since the fever as before. She spoke only in a whisper, and had become quite discouraged about recovering the voice again at her age: indeed, she had come to consult me with great unwillingness on her part and only on the urgent advice of friends.

On examination with the laryngoscope, the cords were seen to approach each other equally well on attempted



A is the anterior insertion of the vocal cords; a, a, are the arytenoid cartilages; v, v, the vocal processes; c, arytenoid commissure.

movement would seem to be the following: Inspiration is the result of strong muscular action, and the air consequently enters the passages with considerable velocity. Expiration is, however, principally a passive act, being the result of a relaxation of muscular action and the contraction of elastic tissues, and there is, consequently, less power in the current of air. We might, therefore, expect to find, as we do, a temporary enlargement of the glottic aperture with the inspiratory act. But it is not unreasonable to suppose that this movement of the cords is a consequence of their peculiar form, a form, by the way, necessary to the best phonetic results. These ligaments are, namely, removed during inspiration from a position where, otherwise, the current of air would tend to make them approximate, and so obstruct respiration.

phonation, but to a certain extent only, the vocal processes not coming in contact, and the cartilaginous glottis remaining open (Fig. 5.)¹ No other abnormal appearances of any kind were discovered in the larynx.

It being evident that the difficulty was paralysis of the adductors, treatment by manipulation was determined upon, but on account of the mental depression, to which allusion has been made, and which was really quite marked, it was thought best to endeavour previously to excite the patient's interest, and inspire some degree of hope, by a pretended use of electricity. A very feeble electric current was consequently passed through the neck for a few seconds, with no effect upon the voice. The wings of the thyroid cartilage were then compressed, and the patient was instructed to endeavour to make a sound. In the course of perhaps five minutes a sound was produced, and she immediately after spoke in a sufficiently strong voice, which continued after the removal of the compression.

The day following Mrs. C. returned to my office and was speaking in a loud, strong tone. Since this second visit I have not seen her, but members of her family have informed me that she has continued to retain the voice.

Remarks.—Although the electric current was employed in this case there is no reason for believing that it had the slightest influence in the restoration of the voice, for while a moderately strong current passed from the interior to the exterior of the larynx is often the means of curing the aphonia at once, yet the treatment by electricity externally is successful only after its employment for a considerable time—days and even weeks being required.

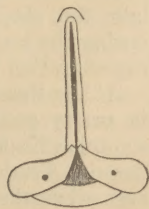
CASE II.—Mrs. —, aged forty, was brought to me by Dr. Joseph Garland, of Gloucester, Mass., November 22, 1867. Her health had been pretty good till ten years before, when she had uterine difficulty lasting two years. At one time, as Dr. Garland reported, marked ulceration and hypertrophy of the neck of the womb existed. Four years subsequently, she again had a similar trouble, her health again became affected and she had been feeble ever since. Amenorrhœa had existed for some months. Some slight hysterical manifestations had been noticed. Two years previously to her consulting me aphonia came on suddenly, and although she thought she had been able to make a single sound above a whisper, once or twice since, there had been no real restoration of the voice.

Her appearance was characteristic of a general and marked want of vitality. On making very light pressure along the spine, tenderness was complained of, at various points.

On examination with the laryngoscope the larynx had a perfectly healthy look. On attempted phonation, the ligamentous glottis closed, the vocal processes being in apposition, but the cartilaginous glottis remained open (Fig. 6).

Manipulation of the larynx was at once resorted to, firm pressure being made upon the wings of the thyroid cartilage, as in the previous case, and the patient was asked to count *one, two, three.*

Fig. 6.



¹ This and the succeeding figures are nearly after Tobold.

After a trial of a minute or two, merely, a voice-sound was heard, and almost immediately afterwards every attempt was successful, so that when the compression was discontinued she spoke in a moderately loud tone. After no doubt existed that the voice was really restored, the patient was dismissed with instructions to read aloud daily and cautions to repress any tendency to whisper. Tonics, etc. were also advised.

A week or two after, Dr. Garland informed me personally that the voice was still good. Subsequently, I supposed that the case was doing well, since I heard nothing to the contrary, but, in reply to a letter of inquiry in the spring of 1869, Dr. G. wrote that the voice gradually became weaker during the winter of 1867 and 1868, until complete aphonia again occurred. A second visit from the patient was requested, but I have not seen her since.

Remarks.—The voice was not permanently restored in this case, but this fact does not invalidate the efficacy of the method of treatment employed. The relapse would undoubtedly have occurred whatever method had been selected, and was due to the want of vitality in the general system. It is but just to add that Dr. Garland seems to have done all that was possible to improve the condition of the patient after the temporary restoration of the voice; and in addition to the general course of treatment, he employed the inhalation of the spray of stimulating solutions, and electricity.

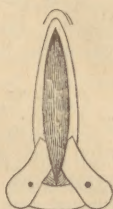
CASE III.—Miss W.—, seamstress, aged 31, was brought to me by Dr. D. McB. Thaxter, of South Boston, June 17, 1868. Her health had never been very good; she had always been "subject to lung troubles;" had also had menstrual difficulties, the menses having been sometimes absent for six months at a time. In the fall of 1858, she had lung fever. In the spring of 1859, she contracted a "cold," was hoarse and had some indefinite pulmonary symptoms. At this time her voice left her and was absent three months, returning suddenly. In March, 1860, she had an attack of "congestion of the lungs." Towards the latter part of this illness she lost her voice again, this time suddenly, and she had not spoken a loud word since then, a period of eight years.

On several occasions in the two years previous, Miss W. had raised blood in slight amount, mixed with "phlegm;" at these times there was no menstrual irregularity. Her general health had, however, rather improved in these two years, and she had gained in flesh and strength. Of late, too, she had had less menstrual disturbance. On the other hand, during the last four months she had had more cough than formerly, with expectoration of varied character and some pain in upper part of chest.

At the time of the consultation, Miss W. had a delicate look, but was in pretty good flesh. Appetite, good; pulse, 80. She articulated in a smooth whisper, and with all her efforts, a voice-sound could not be produced. Tenderness was found at various points in the length of the spine, even when the pressure was very light. General tenderness of the larynx on pressure was also complained of. An examination of the lungs revealed no definite sign of disease of any kind. With the laryngoscope no inflammatory or other abnormal appearances were discovered in the larynx. On attempted phonation, however, complete closure of the glottis did not take place. The shape of the glottic aperture varied. At one time the vocal

cords would be approximated for the greater part of their length, the vocal processes remaining somewhat separated, and the cartilaginous glottis being open. The appearance then was much as represented in Fig. 5, Case I. At another time the arytenoid cartilages would be approximated in such a way that the posterior portion of the cartilaginous glottis was closed, while the vocal processes were far apart and the ligamentous glottis, consequently, open (Fig. 7).

Fig. 7.



Notwithstanding the aphonia had existed for so long a period, I determined to try the effect of compressing the thyroid cartilage. This was done, with simultaneous attempts at the production of sound on the part of the patient. In ten or fifteen minutes (including intervals of respite), a voice-sound was heard, although weak in character. After becoming convinced by repeated trials that the cords were vibrating, and having been obliged to exercise considerable pressure upon the larynx, I desisted from further treatment for the day, but urged the patient to endeavour to continue speaking aloud. The following day she again visited me. The larynx was somewhat more tender, the result, perhaps, of the compression. She could, however, speak in a moderately loud tone and no further manipulation of the larynx was made. There was a tendency to whisper at every few words, while a necessity existed for taking breath frequently, the result of the feeble approximation of the cords which allowed the air to escape too freely. Daily exercises in reading aloud, open air exercise, and tonics were advised. Meanwhile she visited me daily for a week. The tendency to whisper and to take breath frequently, diminished steadily, while the voice became stronger. In the latter part of July she left Boston for her native town in New Hampshire for the improvement of the general health, the voice continuing good.

In February, 1869, I received a letter from Miss W., in which she says, "My voice is comparatively strong. * * I can sing a little. My cough is still troublesome and there is some weakness through the lungs and shoulders, but I ought not to complain when I compare my condition with that of a year ago. Society then was a dread to me, now it is a pleasure."

CASE IV.—John P., aged 13, was brought to me by his parents Dec. 23, 1868. They reported that he had had fair general health, but had always been a "nervous and very uneasy boy." Three months before, he had lost his voice suddenly while at school, and had since then made no sound above a whisper. For a few days previous to the aphonia he had a slight "cold," but no hoarseness. Treatment of various kinds had been employed, by the family physician and others, directed to a supposed inflammatory condition of the larynx.

The boy had a general feeble look and exhibited decided marks of nervousness. On being shown the laryngeal mirror and requested to examine it, he first hesitated to touch it, and then laughed and cried alternately. Laryngoscopy was nevertheless easy. No inflammatory appearances were observed in the larynx. On attempted phonation, the vocal cords were approximated in the normal way, but were immediately forced apart again by the current of air, without vibrating. The left cord seemed to yield somewhat more readily than the right.

Manipulation was resorted to, and a voice-sound was produced in a few minutes, and full restoration of the voice within fifteen minutes. A

disposition to whisper the first word of each sentence existed during his stay at my office, but he was made, in each case, to commence the sentence anew, and this tendency constantly lessened. Tonics, &c., were advised, and his parents were counselled to remove him from school for a time.

This patient I have seen once since, and have heard from him many times. His general health is much improved, and the restoration of the voice has been permanent.

CASE V.—Adeline L., aged 14 years, was brought to me by her mother, Feb. 13th, 1869. She had always been in good health. Had menstruated once only, and that five weeks previously. Never manifested hysterical symptoms. In April, 1868, she had a "cold" and was a little hoarse: this passed away gradually in a few days. Two or three days after apparent recovery, her voice left her suddenly and she had not spoken aloud since. She had been obliged to give up school, and had been under medical treatment, but had been told that nothing more could be done to restore the voice.

She appeared to be in good general health. On examination with the laryngoscope, the larynx appeared to be perfectly healthy. On attempted phonation, the vocal cords approached the median line equally, but did not come in contact with each other, and the cartilaginous glottis remained open, the appearance being much as in Fig. 5, Case I. The current of air, moreover, immediately forced the cords apart. There was, therefore, marked weakness of the adducting power, and on account of this circumstance and of the probability, also, that this weakened condition of the muscles was due to the inflammation of the parts which had immediately preceded the aphonia, I anticipated considerable difficulty in restoring the voice, and so expressed myself to the mother. Manipulation of the larynx was, however, immediately begun, with the usual instructions to the patient to attempt to make a sound. For a time her efforts were quite futile, and no sound indicating the vibration of the cords could be heard. It was at this juncture that it occurred to me that advantage might be taken of the valvular character of the cords, to which allusion has been made at some length. She was, therefore, instructed, during compression of the thyroid, to make sudden and strong inspirations, and to endeavour to make the breathing noisy. The inspirations soon disclosed a marked noisy character, the expirations much less so. She was then asked to make a sound, either with inspiration or with expiration. Gradually the inspiratory act seemed to acquire a vocal character, and it was not long before it was certain that the cords were in action. Subsequently, attempts to produce a sound with the expired current of air were successful, the larynx being still compressed, while shortly after the voice was completely restored. She was made to read aloud for some minutes after the recovery of the voice, which became notably stronger as she progressed. There was, however, in conversation, some tendency to whisper occasionally. Her mother was desired to make her read aloud many times daily, and not to allow whispering without reproof.

The whole time occupied in the restoration of the voice was a little short of an hour, including respites. I have seen this patient once or twice since, and have heard from her frequently. The recovery has been permanent.

CASE VI.—A. B., a female domestic, aged 26 years, was brought to me by Dr. O. O. Davis, of North Andover, Mass., Sept. 27th, 1869. Her

general health had been fair, but she had had at times leucorrhœa and dysmenorrhœa, although the monthly periods had been regular. She was reported to be of a nervous temperament, but no hysterical symptoms had ever been noticed. During the second week of January preceding, she contracted a cold and had pain in swallowing, hoarseness, cough, and some expectoration. These symptoms passed away gradually, but there was general prostration of strength remaining, and the voice was weak. In the early part of the day she could often not speak loud at all, but the voice would appear in the course of the day. Complete aphonia occurred in the latter part of February. There was a time in the spring following, when she could occasionally, by extra effort, make a sound in a low unnatural tone; but, except that, she had spoken only in whisper since February.

This patient had a pale and "flabby" appearance. Light pressure along the spine caused complaint at several different points. The larynx was also somewhat tender on pressure. On examination with the laryngoscope, nothing abnormal was seen beyond a slight redness of the mucous membrane of the vocal cords near the opening to the ventricles: the greater portion of these ligaments were of the normal colour. On attempted phonation, the cords were nearly or quite approximated at the median line, but the vocal processes did not come into complete contact with each other, and the cartilaginous glottis was not closed: and when the air was forced against the cords they immediately separated without vibrating. Manipulation was at once resorted to. For a time the patient entirely failed to make a sound with expiration, and attempts with inspiration were advised. A few minutes only elapsed before a sound was heard, rough indeed, but evidently produced by the vocal cords. This sound gradually improved in strength and quality, and, in a short time, a sound with expiration was made. Finally, in about twenty minutes from the commencement of treatment, the full voice appeared, and she spoke without the aid of compression. There was a slight tendency, for a time, to whisper in conversing, as in some of the previous cases, but this did not exist in reading, the tone being clear and loud. The disposition to whisper, moreover, nearly or quite disappeared before the patient left my office.

The usual instructions with regard to reading aloud daily were given, and tonics were advised. The recovery has been permanent.

Remarks.—In these last two cases, it was certain that a voice-sound could be produced with inspiration, before it was possible with expiration: and it was also many times demonstrated, before complete restoration of the voice took place, that this sound was easily made, both in expiration and inspiration, with the aid of compression of the thyroid, when nothing above a whisper was possible without such aid. During the treatment of the last case these facts were brought to the notice of Dr. Davis.

It is perhaps unnecessary to say, that no local treatment for aphonia ought to be employed without a preliminary laryngoscopic examination and diagnosis. Especially should Manipulation not be attempted without such examination, for this treatment would not only be useless in most cases of unilateral or "constant" paralysis, but might be positively injurious, this form of paralysis being, generally, due to compression of the recurrent laryngeal nerve by an aneurism, by enlarged bronchial glands, or

by malignant growths, or to organic disease of the pneumogastric nerve itself. When, moreover, the examination shows the case to be one of paralysis of the adductors, it should be made reasonably certain that the cause does not lie at the nervous centre: this is, however, of extreme rarity.

Excessive general debility may also contraindicate Manipulation, as may a decided tendency to hæmoptysis.

Finally, the normal action of the vocal cords is often obstructed by organic changes in the tissues of the larynx, in which case treatment of the accompanying aphonia by compression would be injurious.

If any doubt should be entertained of the safety of Manipulation, I answer that experience has not developed any ill effects from its employment in suitable cases, and that old age as well as youth has offered subjects for the trial. It is understood that the force exercised should be confined to reasonable limits; it is, of course, possible to do injury to the larynx by the employment of great force.

But I am not disposed to claim for this method of treatment advantages over some other methods: on the contrary, I am free to acknowledge that, where there is a prospect of restoring the voice at once, or even within a reasonable time, by stimulating injections, by the employment of electricity, or by the "gymnastic" of Von Bruns, these methods might be, in many cases, preferable: I simply suggest a method not before, to my knowledge, described, and feel justified in saying that it is efficient and safe: it is certainly not without interest in a physiological point of view.

In the cases above-recorded, none of the usual methods of treatment were employed, because I desired to test the value of Manipulation; so that it is not certain that a single electric shock in the larynx would not have restored the voice immediately in all the six cases. I am, however, inclined strongly to the belief that in Case III., in which the affection was of eight years' duration, and in Case V., the most obstinate of the number, a prolonged course of treatment would have been necessary.

It is not unusual for physicians to advise patients with aphonia which they, often rightly, deem to be due to a debilitated condition of the general system, to make a change of residence, or to travel, telling them that the voice will return when the health improves. Recovery will undoubtedly be the result in many of such cases, but the loss of the voice is a serious infirmity, and has a constant depressing effect upon the individual. The more rational plan would seem to be to advise, first, an attempt to restore the voice, and if the result be successful, travel and other means of improving the health, to insure the permanency of the cure.

Since the foregoing pages were written, a striking proof of the influence of the inspiratory act upon phonation has presented itself to me, confirming the views expressed therein.

A lady, sixty years of age, came to me with an almost total inability to speak in the usual manner with the expired current of air: a condition of

six or seven years' duration. A single sound could be thus made, and monosyllables spoken, but with great difficulty and uncertainty, while it was impossible for her to speak a short sentence, or even to pronounce a word of more than one syllable. Each syllable, namely, required a separate and marked effort, while sometimes a double effort was required, as *ma-an* for *man*. The difficulty was not so much an inability to approximate the cords, as the want of power to maintain the approximation; and the adductor muscles were the ones at fault. Now this lady had discovered that she could speak while drawing in the breath, and had become accustomed to use the voice wholly in this way. There was an evident effort about it, as may be supposed, but speaking in the usual way, with expiration, was quite impracticable. In this instance the air passing in one direction, forced apart the weakened cords, while, when passing in the opposite direction, it tended to keep them in position, both influences being dependent purely upon the anatomical formation of the parts.

It will be naturally inferred that, if the compression of the thyroid wings produces the results above-mentioned, some aid might be afforded in derangements of the voice dependent on *moderate* loss of power of the adductor muscles; and such I have found to be the case, the voice becoming notably stronger during compression.

It may not be irrelevant in this connection to remark, that, in some cases of weakness of the voice apparently dependent upon a want of proper tension of the vocal cords, I have found material aid to be afforded by imitating the action of the crico-thyroid muscles, which are tensors of these ligaments. This is done by raising the anterior portion of the cricoid cartilage, approximating it to the lower front border of the thyroid cartilage.

ART. II.—*Observations on Poisoning with Rattlesnake Venom.* By S. WEIR MITCHELL, M. D. With *Microscopical Notes* by Jos. G. RICHARDSON, M. D.

I HAVE been able during the past summer to make observations upon certain points connected with snake poisons, which serve to complete portions of my former studies. I have also afforded to Dr. Richardson an opportunity of studying with higher powers than those formerly used by me, the blood of animals which were sick or dead from snake venom. His observations prove to my entire satisfaction the correctness of the belief I have already published as to the peculiar corpuscles described by Dr. Halford. Although I had long since criticized this gentleman's views, and pointed out that what he saw were probably Leucocytes, no one as yet has shown how it is that these come to assume the appearances described by Halford. Thus far all observers have failed to see the